LADISH VALVES

INSTALLATION, OPERATION, MAINTENANCE MANUAL

MANUALLY OPERATED FORGED GATE, GLOBE, CHECK VALVES

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CONTENTS

1.0 GENERAL

The majority of this information is common knowledge to experienced forged steel valve users. This information applies to all standards ASME B16.34 and API Std. 602 Forged steel valves. When properly installed in applications for which they were designed, LADISH valves will give long trouble free service.

We do recommend however that this entire document be read prior to proceeding with any installation or repair.

1.1 Responsibility for Valve Application

The End User is responsible for ordering the correct valves. LADISH VALVES are to be installed in the observance of the pressure rating and design temperature.
Prior to installation, the valves and nameplates should be checked for proper identification to be sure the valve is of the proper type, material and is of a suitable pressure class and temperature limit to satisfy the application requirements.

Do not use any valve in applications where either the pressure or temperature is higher than the allowable working valves. Also valves should not be used in service media if not compatible with the valve material of construction, as this will cause chemical attacks.

1.2 Receiving Inspection and Handling

Valves should be inspected upon receipt to determine: Compliance to purchase order requirements.

Correct type, pressure class, size, body and trim materials and connections

(this information may be found on the nameplate or may be stamped on the body of valve). Any damage caused during shipping and handling to end connections, handwheel or stem.

The End User is advised that misapplication of the product may result in injuries or property damage. A selection consistent with the particular performance requirements is important for proper application.

2.0 INSTALLATION

Piping should be properly aligned and supported reduce mechanical loading on the end connections.

2.1 Installation Positions

Gate valves are usually bi-directional, and therefore may be installed in either direction. In some special cause, gate valves may be uni-directional, in which case the direction of flow will be indicated on the valve body.

Globe and check valves are uni-directional, and have the direction of flow indicated on the valve body.

Lift Check valves are recommended for use only in horizontal lines with the cover facing up.

Spring loaded lift check valves are recommended for use in horizontal line only, but may be installed with the cap facing down as well as up.

Swing and tilting check valves may be installed in horizontal lines or vertical lines where the direction of flow as indicated on the valve body is upwards.

2.2 Preparation for Installation

Remove protective end caps or plugs, and inspect valve ends for damage to threads, socket weld bores of flange faces.

Thoroughly clean adjacent piping system to remove any foreign material that could cause damage to seating surfaces during valve operation.

Verify that the space available for installation is adequate to allow the valve to be installed and to be operated.

2.2.1 End Connections

Threaded Ends

Check condition of threads on mating piping. Apply joint compound to the male end of joint only. This will prevent compound from

entering the valve flow path.

LADISH valves have wrenching lugs forged onto the body ends. Wrenches should be used on the valve end closest to the joint being tightened.

Flanged Ends

Check to see that companion flange are dimensionally compatible with the flange on the valve body and make sure sealing surfaces are free dirt.

Install the proper studs and nuts for the application and place the flange gasket between the flange facings.

Stud nuts should be tightened in a crisscross pattern in equal increments to ensure proper gasket compression.

Socket weld Ends

Remove all grease, oil or paint from the pipe that is to be welded into the valve and from the valve end connections.

Insert the pipe into the valve end connection until it bottoms out in the socket weld bore. Withdraw the pipe 1/16" so that a gap remains between the pipe and the bottom of the socket weld bore to prevent cracks (ASME B16.11).
Tack the pipe into the valve and complete the fillet weld.

Gate and globe valves should be lightly closed to prevent damage to the seating surfaces and stem caused by thermal expansion during the socket welding process.

2.3 Post-Installation Procedures

After installation, the line should be cleaned by flushing to remove any foreign material. When caustics are used to flush the line, additional flushing with clean water is required.

The valve should be opened and closed after installation to ensure proper operating function.

With the line pressurized, check the valve end connections, body to bonnet/cover joints and stem packing area for leaks. The packing may have to be tightened to stop packing leakage at the system pressure.

3.0 OPERATION

Gate valves should be used only in the fully opened or fully closed position.

Globe valves should not be used continuously at opening less than 25%.

Gate and globe valves should not be left in the fully back seated position under normal operating conditions. The packing may dry out under these conditions and leak as the valve is closed.

Metal seated check valves are not zero leak devices and may "seep" in service.

This type of valve should always be backed up with an isolation valve (either gate or globe)

4.0 MAINTENANCE

Proper PPE should be worn when preparing to service a valve.

Observe the following general warnings:

1. *A valve is a pressurized device containing energized fluids and should be handled with appropriate care.*
2. *Valve surface temperature may be dangerously too hot or too cold to the skin.*
3. *Upon disassembly, attention should be paid to the possibility of releasing dangerous and or ignitable accumulated fluids.*
4. *Adequate ventilation should be available for service.*

Tools Required

Standard wrenches (for bonnet cap screws and packing gland nuts) and a tool to properly remove the packing are needed for Ladish Valve maintenance.

Packing

Special care is to be placed in the tightening of gland nuts during installation, in order to get the proper packing adjustment and functionality.

The packing gland should be checked periodically in service and tightened as necessary to stop leakage around the stem. Tighten in a manner to develop uniform loading on the gland. Tighten only enough to stop the leak.

Over tightening will cause the packing to fail prematurely as well as increasing the force required to operate the valve.

If the leak cannot be stopped by tightening the gland nuts, it is necessary to add additional packing rings or completely repack the valve. While LADISH gate and globe valves are equipped with a backseat feature, it is NOT RECOMMENDED TO REPACK THEM UNDER PRESSURE.

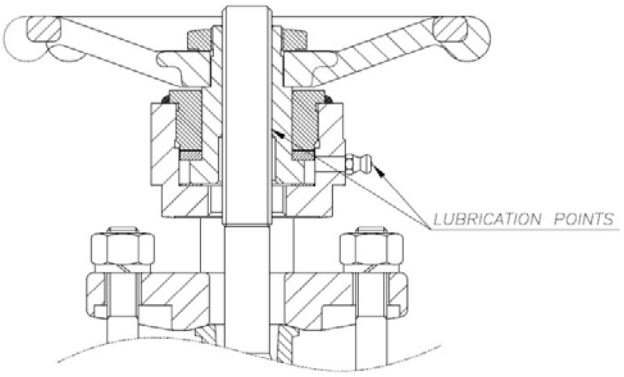
Back seating the valve and attempting to repack under pressure is hazardous and is not recommended. Rather than attempting to repack under pressure, it is preferable to use the backseat to control the stem leakage until a shutdown provides safe repacking conditions.

The end rings (top and bottom) of the standard LADISH graphite packing set have a diagonal cut that will allow them to be installed around the stem of an assembled valve. However, the factory installed intermediate graphite packing rings are die formed and have no end cut. As a result, these rings cannot be replaced without removing the valve bonnet. If the valve is to be repacked without removing the bonnet (see repacking the valve in line below), care must be taken when removing the original packing not to scratch the valve.
Where it is necessary to repack the valve in line, a compatible ribbon packing system or equivalent braided packing stock should be used. The joints in the packing rings should be diagonally cut. When installing the rings, care should be taken to stagger the ring joints.

Other specially packing such as V ring Teflon will require that valve be disassembled if repacking is required.

Stem Sleeve & Thread Lubrication

The operating Yoke Sleeve of LADISH OS&Y Gate and Globe valves requires proper lubrication to stem threads and/or to bonnet.



The following is the proper grease

application method: If valve

is CLOSED:

Apply grease below the yoke nut
onto stem threads Open valve to
the full open position
Apply grease to the stem thread
protruding above the yoke nut Close valve
to the full close position
Cycle1 additional time full open to full close to evenly apply grease inside yoke nut

If valve is OPEN:

Apply grease above the yoke
nut onto stem threads Close
valve to the full close position
Apply grease to the stem thread
below the yoke nut Open valve
to the full open position
Cycle1 additional time full open to full close to evenly apply grease inside yoke nut

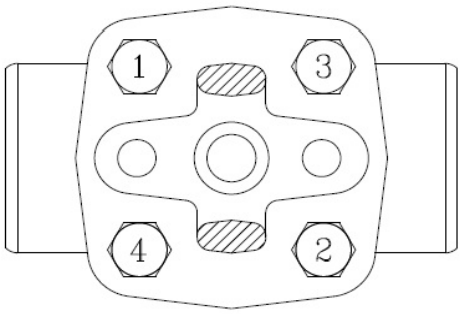
4.1 Repairs

Due to the relatively low replacement cost of standard carbon steel valves, it is usually less expensive to replace the complete valve than to have maintenance personnel effect repairs. Additionally, in the case of a gate valve, it must be removed from the line in order to replace seat rings.

Always replace the bonnet gasket whenever a valve is disassembled. Gasket seating surfaces should be scraped clean (avoid radial marks). Bonnet bolts should be tightened in a torque value is attained.

5.0 BODY-BONNET/COVER BOLTING

Only proceed to this operation changing one bolt at a time to prevent losses of pressure on the gasket.
As the following figure.



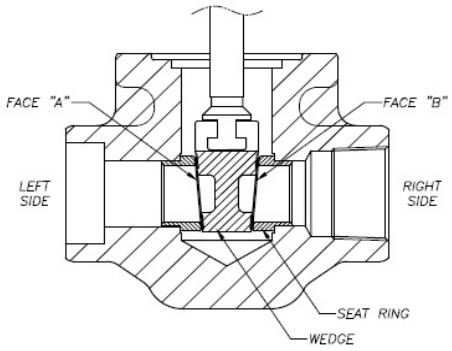
BOLTING SEQUENCE

6.0 MAINTENANCE ON BOLTED BONNET GATE VALVES

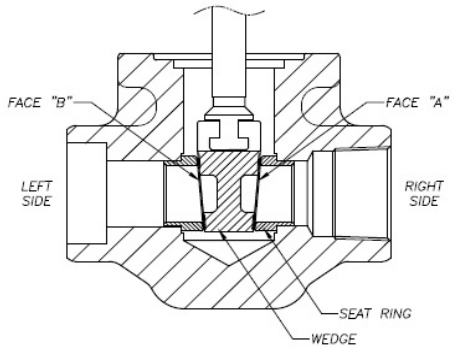
6.1 Wedge

a. Proceed opening completely the valve assuring that the stem is brought to the backseat position.
b. Loosen the body-bonnet bolting.
c. Remove the bonnet-stem assembly. Take note of wedge sealing surface relative to the valve seats. Faces should be

matched during reassembly. Extract wedge from the stem T-head.



RIGHT POSITION



WRONG POSITION

d. Check that no incisions or marks are on sealing surface. If any, use fine sand paper or emery cloth to eliminate them, assuring that the original planarity of these surface is not modified.
e. Replace the gasket between body and bonnet, insert wedge in the stem T-head marking sure that the faces are matched as noted above.
f. Bring the bonnet-stem assembly to its original position and tighten the body-bonnet bolts as described in section 5.

6.2 Stem

a. Proceed opening completely the valve assuring that the stem is brought to the backseat position.
b. Loosen the body-bonnet bolting.
c. Remove the bonnet-stem assembly. Take note of wedge sealing surface relative to the valve seats. Faces should be matched during reassembly. Extract wedge from the stem T-head.

d. Disassemble the stem by turning it in the counter-clockwise direction.
e. Make sure that the stem surface in contact with the packing is not damage. If the stem is damaged beyond repair, call for a stem replacement or consider replacing the entire valve.
f. Replace the stem by screwing it clockwise in the bonnet.
g. Replace the gasket between body and bonnet, insert wedge

in the stem T-head marking sure that the faces are matched as noted above.

h. Bring the bonnet-stem assembly to its original position and tighten the body-bonnet bolts as described in section 5.

6.3 Seats

No repair are possible on seats of gate valve. Replacement of seat is possible, provided the right tools are available.

Blunt chisels and a hammer can be used to remove the old seats after removal of the bonnet-stem and wedge assembly. New seats must be assembled by expanding the end as shown. We recommend that this process be carried out only in our factory where proper tooling is available, or call us for a replacement valve.

7.0 MAINTENANCE ON BOLTED BONNET GLOBE VALVES

7.1 Disc & Seat

The seating surface is integral to body. To check the seal characteristics between the disc and body seating area, we suggest the "BLUEING TEST":

a. Proceed opening completely the valve, assuring that the stem is brought to the backseat position.
b. Loosen the body-bonnet bolting.
c. Remove the bonnet-stem and disc assembly. Apply some prussic-blue on the body seating surface.
d. Place the bonnet-stem and disc assembly in the original position, and tighten the bolts as described in section 5.
e. Take the valve in the close position, wait 20 seconds, and repeat steps "a" and "b" above. f. Remove the bonnet again, and check that the blue trace on the disc and the body is uniformly present on the contact surface.

If this has not occurred there are two possibilities:

- There are incisions or marks sealing surfaces, either the disc or body. Check and, if any, use fine sand paper or emery cloth to eliminate them, taking care that the original planarity of these surfaces is not modified.
- Repair is not possible because great damage has occurred. Contact our sales department giving details as described later to receive a new disc and replace it.

g. Replace the body-bonnet gasket.

h. Reassemble the bonnet-stem and disc assembly and tighten bolts as described in section 5.

7.2 Stem

a. Proceed opening completely the valve, assuring that the stem is brought to the backseat position.

b. Loosen the body-bonnet bolting.

c. Remove the bonnet-stem and disc assembly. Extract the disc from the stem end.

d. Disassemble the stem by turning it in the counter-clockwise direction.

e. Make sure that the stem surface in contact with the packing is not damage. If the stem is damaged beyond repair, call for a stem replacement or consider replacing the entire valve.

f. Replace the stem by screwing it clockwise in the bonnet.

g. Replace the gasket between body and bonnet, insert disc into the stem end.

h. Bring the bonnet-stem assembly to its original position, and tighten the body-bonnet bolts as described in section 5.

8.0 MAINTENANCE ON BOLTED BONNET CHECK VALVES

There are three types of check valves: lift, tilting and swing type

8.1 Lift check valves and their seats

a. Seats are integral to body.

b. Loosen the body-cover bolting.

c. Remove all parts, taking note of the order of disassembly.

d. Visual check all sealing surface.

e. No incisions or marks shall be on sealing surfaces.

f. If any on the body sealing surface, use emery cloth to eliminate them, assuring that the original planarity of the surface is not modified.

g. If there are any incisions or marks on the disc or the above step is not successful, contact our sales department giving details as described later to purchase a new disc or a replacement valve.

h. Replace the body-bonnet gasket.

i. Reassemble the valve in the reverse order of the disassembly, and tighten the bolts as described in section 5.

8.2 Swing type valve

a. Loosen the body-cover bolting.

b. Remove the cover.

c. Visually check all sealing surfaces

d. No incisions or marks must be on sealing surfaces.

e. If there are damages, proceed with the aid of a hinge pin extractor to disassemble the swing. Note the order of disassembly.

f. If possible, use fine sand paper or emery cloth to eliminate incisions or marks, assuring that the original planarity of the surface is not modified. If results are not satisfactory, replace the entire valve.

g. Replace the body-bonnet gasket.

h. Reassemble the valve in the reverse order of the disassembly, and tighten the bolts as described in section 5.

8.3 Seat for swing type valves

Similar to the gate valve, only limited work is possible. Refer to the gate valve section 6.3.

9.0 GATE, GLOBE & CHECK VALVES WELDED BONNET OR CAP

The only one difference with respect to the above mentioned cases is that there is a weld between body and bonnet or cover.

Maintenance is only limited to the packing area.

10.0 POST WELD HEAT TREATMENT (PWHT)

10.1 PWHT Responsibility

LADISH is responsible for all valve fabrication PWHT during manufacture of valve. The end user is responsible for any PWHT required after welding the valve in line.

10.2 PWHT Requirements / Recommendations

PWHT shall be performed in accordance with the appropriate user's WPS-PQR instructions.

All heating shall be performed with localized heating equipment to minimize adverse effects to the rest of the valve. The heat band shall be extended to include the weld HAZ (heat affected zone) of the joins.

In the absence of a governing specification, the requirements of ASME B31.1 or B31.3 for PWHT shall be considered.

Furnace heating of a complete valve assembly is not recommended as supplied valve trim part material conditions can be adversely impacted and the packing and gasket may be damaged or destroyed.

Please note that welded bonnet valves cannot be disassembled without the removal of the weld. This design should not be used if the valve assembly must undergo PWHT in a furnace. In the case, a bolted bonnet design valve should be used.

10.3 PWHT Procedure

The following steps relate to post weld heat treatment of valve welded in line.

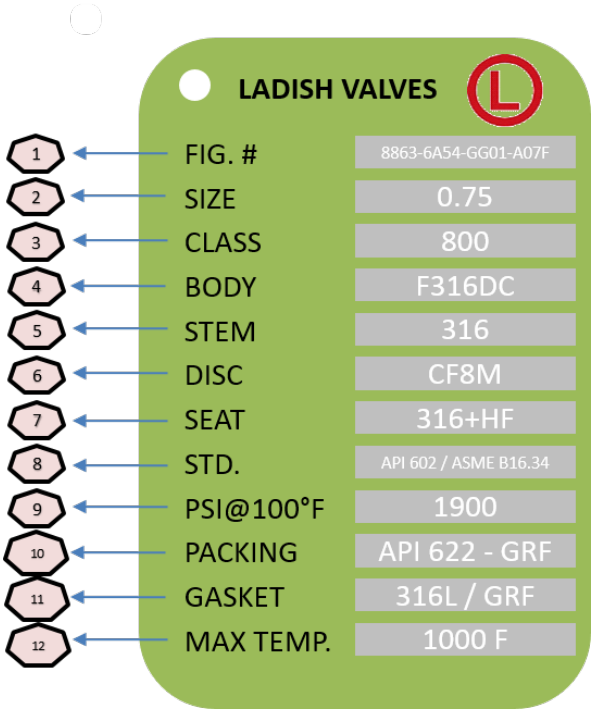
For bolted and welded bonnet valves (localized heating):

1. The recommended method of PWHT is through localized ceramic resistance heaters, while being monitored with thermocouples.
2. Thermocouples should be attached to the welds
3. DO NOT WRAP THE VALVE BODY with heating element.
4. Wrap insulation around valve ends.
5. Prior to heating close the valve completely and open approximately 1/16 of a turn, after the freeing of handwheel has run out.
6. The minor opening will allow the trim components to expand and relax through the thermal cycle.

11.0 THE NAMEPLATE

Each LADISH valve is equipped with an identification nameplate, placed over the handwheel or applied to gland packing for gate and globe valves and on the cover of check valve.

The following is an example. The figure shows several descriptive data. The meaning of each data is given below:



1. Ladish Figure Number
2. Valve Size.
3. Pressure Class.
4. Body/Bonnet material.
5. Stem Material
6. Disc/Wedge Material
7. Seat Material
8. Applicable design codes.
9. Maximum working pressure at reference ambient temperature per ASME B16.34.
10. Packing Material
11. Gasket Material
12. Maximum Temperature